DOCUMENT RESUME

ED 108 764 PS 007 971

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TITLE Attending Development. A Performance-Based Early Childhood-Special Education Teacher Preparation Program. Monograph 12.
INSTITUTION Virginia Univ., Charlottesville. School of Education.
SPONS AGENCY Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.
PUB DATE 74
GRANT OEG-0-7104153(603)-71-74
NOTE 37p.; For other documents on this program, see PS 007 960-974; Some pages may reproduce poorly

EDRS PRICE MF-$0.76 HC-$1.95 PLUS POSTAGE
DESCRIPTORS *Attention; Attention Control; Attention Span; Behavioral Objectives; Behavior Change; Bibliographies; *Cognitive Development; Conceptual Tempo; *Early Childhood Education; Motivation; *Performance Based Teacher Education; Research; *Special Education

ABSTRACT

The attending development module of the Early Education-Special Education Teacher Preparation Program at the University of Virginia deals with various aspects of attention in young children. Areas covered include: (1) developmental aspects of attention; (2) gaining and maintaining attention; (3) motivation and attention; (4) cognitive styles and cognitive controls; (5) cognitive tempo and its applications in intervention strategies for attentional deficits; (6) techniques for facilitating attention, including special classroom environments, direct instruction of attention behavior, modeling, and behavior modification; and (7) evaluation of intervention techniques. For each area a general introduction is provided together with a bibliography of selected readings (some briefly abstracted). Attention competencies needed by the teacher are listed. (ED)

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Attending Development
Carol S. Mueller
Daniel P. Hallahan
Monograph XII

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The development of the program reported herein was supported by the Bureau of Education for the Handicapped of the U.S. Office of Education (OEG-0-7104153 (603)) 1971-1974.

The opinions expressed herein do not necessarily reflect the position or policy of the Bureau of Education for the Handicapped and no official endorsement by BEH should be inferred.

Printed by
Jefferson Printing
215 Albemarle St.
Charlottesville, Virginia
for
A Performance-Based Early Childhood-Special Education
Teacher Preparation Program
at the
School of Education
University of Virginia
Charlottesville, Virginia

All Photographs except Back Cover:
Lovelace Cook

BACK COVER: Ruffner Hall, School of Education, University of Virginia.
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DEVELOPMENTAL ASPECTS OF ATTENTION

Attention is not a unitary phenomenon: it involves the input, integration, and output of information. Thus, studies regarding attention and its development are found in a wide variety of literature concerned with different experimental and classroom tasks. Information about the development of attention can be found in the literature on sensation and perception (perception being given the major emphasis), concept formation, different sorts of learning occurring under a variety of task settings, language usage, and memory. In many studies, output in the form of some performance measure has been the primary indicator of attending behavior. Such measures provide the most convenient way of operationalizing the criteria for attention behavior. Orienting responses on the part of the child, strategies for handling input implied by overt behavior or post-experimental inquiry, and measures of behavior incompatible with attending have been used. In terms of input, studies can be categorized according to the sensory modes involved, e.g., the visual and auditory modalities. Integration, the second step in the chain from input to output is far more difficult to measure. Integration has been considered under a variety of labels including mediation and information-processing, the former being more in accord with the learning theory orientation and the latter, the cognitive orientation. Because these are hypothetical constructs referring to the internal functioning of the child, they have been assessed by taking measures of overt behavior and implying internal operations.

The foregoing considerations are sufficient to indicate that there are many lines of research and strategies of investigation contained in the literature pertaining to developmental attention behavior. The reading at the end of this section of the module will provide a fair sampling of the types of studies relevant to the development of attention. The purpose of this section of the module is to prepare the reader to incorporate research findings on attention into his knowledge of child development.

Selective attention and attention span are two major aspects of attention of relevance to school learning. These two components of attention behavior are intimately related. Generally, it can be hypothesized that greater selectivity of attention, with concomitant screening out of extraneous stimuli, is associated with longer attention span. Both of these skills are correlated with the age of the child. They appear during the preschool period as an outgrowth of involutary attention which is initially reflexive in nature. The Yendovitskaya article (1) traces this development for the student. Particular not should be made of the factors responsible for the change of attention from an undifferentiated perceptual activity to a socialized, purposeful activity with increasing stability. Interactions with an adult through gesture and speech are essential factors in the child's development of object relations and thus perceptual interest in certain objects. This socialized perceptual interest in objects is a precursor of selective attention. Its increasing stability is a forerunner of attention span.

The perceptual component of attention deserves major consideration particularly in the preschool years. The Zaporozhet's article (2) is notable for its approach to this area. Unlike most American research which has in the past emphasized the auditory and visual modes of perception (the latter receiving the greater emphasis). Soviet research, in addition to a major concern with motor development, has also emphasized the kinesthetic

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and tactile modes. Zaporozhets, in fact, has indicated that these sensory modalities are of particular importance for the preschool child whether normal or atypical. They will continue to be of importance for the atypical child up through the early elementary years.

The reader will find the Zaporozhets article pertinent not only for the developmental sensory data it presents, but also for its approach to training of sensory and perceptual skills. The article represents not only an experimental approach to sensory training but a philosophical orientation as well. This position is characterized as one of "intentional environmentalism." Soviet researchers are not satisfied with merely empirical developmental findings or theoretical conceptions: they seek out the differences between successful approaches used by older children and the less successful ones used by younger children. This is done with the following question in mind: how can one teach the younger children to use input data as do the older ones? The focus is on the orienting responses made by different age children to the same sensory inputs under various instructional "sets." Essentially these differences lie in the purposefulness of the orienting activity, this distinction being similar to that between voluntary and involuntary attention. The reader should look for strategies used in Soviet research to enhance the performance of preschoolers on a variety of sensory tasks. There is a common conception of what sensory training should entail contained in all of these strategies. This is that children should be taught to compare sensory data with established systems or standards. Also, children should be taught to model sensory input through overt reproductions of stimulus inputs. The student might wish to compare some of the experimental data and theoretical conceptions of Zaporozhets with Piaget's work. The last section of the article, in particular, integrates the Soviet research and training approach. These bear a very close resemblance to the relationships between the sensori-motor and preoperational stages of cognitive development presented by Piaget.

It has been observed that the child's developing capacity for speech plays a vital role in voluntary selective attention. Most of the articles listed at the end of this section deal in some degree with the role of speech in focusing attention. Yendovitskaya (1) discusses the relationship of the language (gestural and vocal) of the socializing adult to the child"s learning a means for organizing his attention. The gestural aspect of language serves this function fairly early in the child's development with speech gradually becoming more important. Speech comes to serve as a mediator for attention and is far more efficient than the language of gesture. in reviewing some articles using verbal cues to focus the attention of preschoolers, Yendovitskaya points out that as the child develops speech gradually takes on an effective regulatory function. Verbal influences can effect attentional shifts even in young preschoolers, making attention somewhat independent of direct stimulus properties. This function of speech, however, becomes better established and more consistent in older preschoolers and school-age children. As the child matures and reaches school age he can use verbal mediation without relying upon direct cueing. The child is then ready to direct his own attention behavior. The reader should look at the developmental functions of speech as a regulator of attention, as presented by Yendovitskaya and compare them with those presented in Hagen's review article (3), the Sabo & Hagen study (4), and the Kendler study (5). These articles approach the role of speech in a more detailed

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and systematic fashion.

The Hagen article (3) discusses both attention and mediation in relation to children's memory. Mediation refers to the self-directing of attention by labeling whether overt or covert. The reader will be introduced to the concept of mediational deficiency in this article. Basically the concept refers to the observation that young children do not use verbal labels to facilitate their performance on learning or cognitive tasks. The mediational deficiency hypothesis of Reese is that there is a stage in the child's development when verbal labels are present (are produced) but they do not serve as mediators. Thus, there are two aspects or components of mediation and consequently mediational deficiency can result from the absence or failure of either component. (Kendler, 1972). One aspect is called production deficiency, the failure of the child to produce the label which serves as a mediator. The other aspect is termed control deficiency, the failure of the label, even though it has been produced, to yield a distinctive feedback and thus facilitate task performance. Hagen and the researchers he cites use the term "mediational deficiency." The term "control deficiency" as used by Kendler makes sense in the "mediational deficiency" is reserved or used as more generic category for both sorts of deficiency. Both types of deficiency decrease with age. The Kendler article presents a tentative developmental curve for each of the components of mediational deficiency.

The Hagen article presents research showing that inducing children to produce verbal labels for objects in a serial order memory task increases their percentage of recall of the items up until about the age of ten. It's inhibitory action on early items at this age cancels out gains on later items in terms of actual percentage correct. From other studies reviewed in the Hagen article, it becomes apparent that verbal rehearsal is necessary for long term memory, whereas, simply labeling is an adequate mediatory for short term memory. The use of active strategies of which labeling and rehearsal are examples seems to be the key to effective memory. This fits into a developmental framework for mediational sufficiency. The work of both Hagen and Kendler support a three-stage ontogeny of mediational deficiency. At the first stage, children are both production and control deficient. Control deficiencies diminish more rapidly, with production deficiencies lagging behind them. Eventually production deficiency declines as well. This results in the use of successful strategies. Since the research discussed by Hagen generally shows that children past a certain age can use words as mediators, the teacher can facilitate their attention and memory by inducing them to produce mediators and thus respond more actively to the learning situation. Thus, when a child produces mediators and is able to use them as feedback he can better engage in selective attending behavior: that is, he can choose particular aspects of the stimulus environment for processing and ignore other aspects fo the environment.

Research dealing more specifically with selective attention is discussed in the Hagen article. In addition, two other articles, one by Sabo and Hagen (4) and another by Turnure (6), are suggested readings. These articles review research which is theoretically related to the information processing model of Broadbent. The reader should understand this model in order to understand the various research paradigms used to test it. Essentially, the model postulates that there are hypothetical filtering mechanisms which permit selective attention. Incoming information is filtered

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as it comes in through the receptors. Whatever is allowed to pass through filters is held in short term memory for a time and then passes through more filters after which it is subjected to further processing or analysis. Information which is ignored is not so processed and is forgotten. Deriving from this model are two developmental predictions: (a) Improvement in certain cognitive processes occur with age due to a better ability to filter information at both the receptor and short term memory levels; and (b) when the individual is overloaded with information, task irrelevant or incidental information is ignored. A research paradigm based on the model and its predictions is one in which central and incidental or distracting information are presented simultaneously to the subject. Task measures which measure learning or memory are then used.

Research in selective attention using a procedure similar to that above has been pursued using primarily the visual and the auditory modalities, with the former receiving the greater interest. Such research generally shows that central learning or memory increases with age, while incidental learning remains the same or declines. The developmental time scale may be different in visual and auditory selctive attention, however. Maccoby's work is representative of the work done with the auditory mode. Her research shows that between the ages of five and fourteen, the ability to listen selctively increases as a function of age. The Hagen (3) article discusses research in the development of central and incidental learning and memory. Generally, younger children seem to be unable to recall only central stimuli; however, this is not the result of a failure to discriminate between central and incidental stimuli. With age, central stimuli become paramount, with incidental stimuli being ignored. This is especially the case in the overload or distraction situation. The Sabo & Hagen article (4) investigates this further, not only replicating the findings, but also looking at the role of verbal rehearsal. Verbal rehearsal seems to facilitate central memory or learning, especially in older children. Thus selctive attention in older children seems to be related to active strategies (both perceptual and mediational).

Hagen also reviews studies related to selective attention in mentally retarded children. The classic studies of Zeaman and House (1063), showed that retarded children had attentional deficits compared with normal children of the same MA. This study dealt with institutionalized retardates. A study by Hagen and Huntsman (1971) indicates that the attentional deficit may be a by-product of institutionalization itself rather than mental retardation per se. Hallahan, Kauffman, and Ball (1973) have also found learning disabled children of normal intelligence to be deficient in visual selective attention compared to their peers.

Hagen and West (1970) have shown that attentional deficits in retardates can be remediated through the use of appropriate strategies, namely, providing differential incentives for primary and secondary tasks.

The last study cited, the one by Turnure (6), offers a different viewpoint regarding selective attention. This study investigated the paradoxical improvement of performance in children subjected to distraction while solving a series of discrimination problems. This was reported earlier in investigation by Ellis (1963) and Turnure and Zigler (1964) with 7 year olds and 6 year olds, respectively. Although these results are difficult to explain, it may be possible that children who are able to screen out a major distracting stimulus may in the process screen out ordinary distractors present under most task conditions. The possibility that the distractors

used in this study may "force" the subject to concentrate his attention more selectively deserves further study in terms of educational implications. The Turnure study (6) was able to replicate these findings for distractors in range of the children studied (5½ to 7½ years), it may be possible that such paradoxical improvement could be found with auditory distractors in older children. This study seems to indicate that the ability to ignore stimuli is not only a function of age but also the stimulus dimension used. Another interesting finding of this study was that better learners glanced away from the task less and that there was significantly more glancing away after the task had been learned.

In reading the articles which have been briefly reviewed here, the student should try to integrate the different sorts of information they provide about attention. He should recognize that involuntary attention is primarily perceptual in nature and that perceptual development is a necessary precursor of more voluntary forms of attention. The student should recognize the crucial role of language development in selective attention for the ability to use linguistic symbols is essential in directing attention and maintaining attention. The use of language cues by socializing adults (external attention mediators) precedes the use of cues by the child himself (internal attention mediators) in directing his own attention behavior. The use of language is also essential to the development of active strategies of attending behavior. Such active strategies are characteristic of the successful performance of older children and adults in learning and memory tasks. Active strategies involve internal mediation of perception. With this in mind, the student should look for ways of promoting attention which can be applied to the classroom. He should have some basis for diagnosing attention deficits in children developmentally.

Selected Readings on Developmental Aspects of Attention

The following articles are not presented in alphabetical order, but rather are given numbers. These numbers indicate the suggested order of reading for the student. This order follows the order of explication in the Developmental Aspects of Attention section.

(1) Yedovitskaya, T.V. Development of attention. In A.V. Zaporozhets & D.B. Elkonin Ed.) The Psychology of Preschool Children. Cambridge, Mass.: M.I.T. Press, 1971.

(2) Zaporozhets, A.V. Some of the psychological problems of sensory training in early childhood and the preschool period. In M. Cole & I. Maltzman (Ed.) A Handbook of Contemporary Soviet Psychology. New York: Basic Books, Inc., 1969.

(3) Hagen, J.W. The effects of attention and mediation on children's memory. Young Children, 1971, 26 (5), 290-304.

(4) Sabo, R.A. & Hagen, J.W. Color cues and rehearsal in short-term memory. Attention and Retention: Perceptual and Cognitive Factors, Report No. 3, Developmental Program, Department of Psychology, University of Michigan, Ann Arbor, Michigan, 48104, February, 1972.

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(5) Kendler, T.S. An ontogeny of mediational deficiency. Child Development, 1972, 43, (1), 1-17.

(6) Turnure, J.E. Children's reactions to distractors in a learning situation. Developmental Psychology, 1972, 2 (1), 115-122.

Additional References on the Development of Attention

Broadbent, D.E. Perception and communication. New York: Pergamon Press, 1958.

Ellis, N.R. , Hawkins, W.F., Pryor, M.W. and Jones, R.W. Distraction effects in oddity learning by normal and mentally defective humans. American Journal of Mental Deficiency, 1963, 67, 576-683.

Flavell, J.H., and Hill, J.P. Developmental psychology. In P.H. Mussen and M.R. Rosenzweig (Ed.) Annual Review of Psychology. Vol. 20. Palo Alto, California: Annual Reviews, Inc. 1969.

Hagen, J.W. and Huntsman, N. Selective attention and mental retardation. Developmental Psychology, 1971, 5 (1), 151-160.

Hagen, J.W. and West, R.F. The effects of a payoff matrix on selective attention. Human Development, 1970, 13, 43-52.

Hallahan, D.P., Kauffman, J.M., and Ball, D.W. Selective attention and cognitive tempo of low achieving and high achieving sixth grade males. Perceptual Motor Skill, 1973, 36, 579-583.

Maccoby, E.E. and Konrad, K.W. Age trends in selective listening. Journal of Experimental Child Psychology, 1966, 3, 113-122.

Reese, H.W. Verbal mediation as a function of age level. Psychological Bulletin, 1962, 54 (6), 502-509.

Turnure, J. and Zigler, E. Outerdirectedness in the problem solving of normal and retarded children. Journal of Abnormal and Social Psychology, 1964, 69, 427-436.

Zeaman, D., and House, B.J. An attentional theory of retardate discrimination learning. In N.R. Ellis (ed.) Handbook of Mental Deficiency. New York: McGraw-Hill, 1963, 159-223.

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GAINING AND MAINTAINING ATTENTION

Although this material is touched on in parts of the foregoing section and readings, it is necessary to consider some of the developmental data relevant to the gaining and maintaining of attention before discussing some findings of relevance to the classroom situation. (Yendovitskaya, 1971; Luria, 1969)

Attention is at first involuntary in nature. It is the product of unconditioned orienting reactions to novel or intense stimuli. These stimuli may come from either the internal or external environment of the organism. A very important part of the external environment for the human organism is social in nature. This social environment is unique in the sense that language is a part of it. Thus, those persons with whom a young child is associated can use language to direct the child's attention to an object. Because this object has been set apart from other aspects of the environment by gestural and verbal cues of the language, it begins to attract attention without external mediation from an adult. Although such attention isstill involuntary in nature, it is social in content. As the child, through his interactions with adults, begins to manipulate the object, point to it, or give it a name, he receives feedback in the form of changes he has made in the object and the environment. The child is then attracted by these changes which he himself has created. According to Luria, this is voluntary attention in the scientific sense. By voluntary attention is meant "a reflex act, social in origin and mediated in its structure, in the presence of which the subject begins to guide himself by the very changes which he has produced in the environment; and in this way he masters his own behavior." (2)

Vygotskii and Leont'ev, two Soviet researchers, did early research into the gaining and maintaining of attention, using the above mentioned line of thinking. Vygotskii's research was an attempt to show that voluntary attention had its origin not within the child but rather in that which was external to him. Leont'ev investigated the organization of the child's attention and its conversion into voluntary or actively mediated attention. In young preschool children, actions upon objects in the environment resulted in a system of voluntary attention. In the young preschooler such externally mediated activity is unstable, with the child's actions on the environment more as distractors than organizers of selective attention. In young school children, stable, externally mediated attention is possible and results in greater improvements in task performance. In older children mediation is internalized and verbal rehearsal facilitates successful task performance. Thus attention which was first a truly external, unmediated perceptual reflex develops into an external, unmediated volitional operation, and finally into an internally mediated, relatively autonomous function. The most important conclusion to be drawn from experiments with children of successive ages is that for school age children, and externally mediated operation is easily converted into an operation mediated by speech. (2) Although these statements are drawn from Soviet research, one can see the parallel in some of the American research presented earlier.

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According to Gagne and Rowher (1969), writing on instructional psychology, the meaning of attention most relevant for education can be looked at in

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the following manner: factors in instructional settings which bring about the establishment of an attentional set; factors in instruction operating to maintain this set; and conditions operating to override the effects of distractors on the maintenance of an attentional set. (1).

Establishment of an attentional set is influenced by predispositions or capacities. Comparing performance of normal, borderline, and retarded children, Semmel and Williams (1968) found that intentional learning was best for normals and poorest with retardates. Incidental learning of background colors was poorest for retardates when number of exposures was made equal. These subjects were 10 and 11 years old. Using a preferred dimension, either color or form, facilitated the learning of object-categories in young children (Suchman & Trabasso, 1966). When the less preferred dimension was used as a cue, performance was poor. There may also be individual differences in the orienting reflex which affect attention. (2)

The maintenance of attentional sets in instructional settings is of prime importance in early elementary education. Duration of attention span and the effects of distractors are necessary considerations in this context. One can see a ready application of behavior modification and programmed instruction for maintenance of on-task behavior. Such techniques are of utmost importance in dealing with young children. Specific articles applying these techniques to attention will be an important focus in the latter part of this module.

Since the student has already read several articles relating to distraction on a developmental and theoretical level, only brief mention will be made of some additional articles dealing with distraction and academic materials used in preschool and elementaay school. The basal readers so often used in elementary schools and the storybooks to be found in elementary and preschool classrooms often contain many highly colored pictures. Samuels (1967) found that these pictures retarded reading in young children -- they probably served as distractors. Grim (1967) found that enforced delays before responses were directly related to increased reaction time when the opportunity for response was made available in young children but not adults. Presumably, these delays allowed for more distracting stimuli to attract the attention of children. Adults were able to maintain task orientations or sets for a longer period of time without being subject to distraction. Verbal mediation plays a greater role in the mature attention of adults than the developing attention of children. Thus, these differences might be expected. The teacher should try to structure the learning situation so that young children will not have the chance to be distracted during long intervals between the presentation of tasks and the opportunity for response. Tasks should be only as long as the attention span of the child. This may mean that for some children the teacher will have to prepare as many as 30 to 40 activities for one hour of instruction. The teacher should also take note of those things which increase and maintain attention in each child.

Selected Readings on the Gaining and Maintaining of Attention

The articles which follow are presented in an order which should facilitate cognitive understanding and teaching skill.

(1) Luria, A.R. Speech and the formation of mental processes. In M. Cole and I. Maltzman (Ed.) A Handbook of Contemporary Soviet Psychology.

New York: Basic Books, Inc., 1969, 143-150.

(2) Gagne, R.M. and Rohwer, W.D. Instructional psychology. In P.H. Mussen and M.R. Rosenzweig (Ed.) Annual Review of Psychology, Vol. 20. Palo Alto, California: Annual Reviews, Inc., 1969, 381-418.

(3) Haring, N.G. Attending and responding. San Rafael, California: Dimensions Publishing Co., 1968, 1-33.

Additional References on Gaining and Maintaining Attention

Grim, P.F. A sustained attention comparison of children and adults using reaction set and the g.s.r. Journal of Experimental Child Psychology, 1967, 5, 26-38.

Samuels, S.J. Attention process in reading: the effect of pictures on the acquision of reading responses. Journal of Educational Psychology, 1967, 58, 337-342.

Semmel, M.I. and Williams, J. Intentional and incidental learning in normal, borderline, and retarded children. American Educational Research Journal, 1968, 5,233-238.

Suchman, R.G. and Trabasso, T. Stimulus preference and cue function in young children's concept attainment. Journal of Experimental Child Psychology, 1966, 3, 188-198.

MOTIVATION AND ATTENTION

The student should already be familiar with some aspects of this topic, having covered the previous portions of the module and the required readings. Novelty in task materials seems to be intrinsically motivating in attention behavior; although what constitutes novelty at varying ages is subject to great individual differences. Novelty can be used at all levels to promote attention behavior, but it seems most important in young children who have yet to develop mediational capacities. Once the child is able to respond in accordance with the external mediation of the socializing adult, motivation can be manipulated to a certain extent by antecedent conditions. Motivation at this level is still almost completely external and self-perpetuating in nature; the child acts on an object and is reinforced and thus motivated to continue by the changes he himself has made in the object and the environment which are fed back to him. It is thus easy to motivate a child to begin an activity or a manipulation but quite difficult to inhibit such action. This, however, can be accomplished by manipulation of the verbal instructions given, even with younger preschoolers (see Luria, as referenced in the Additional Readings section at the end of the module). Only after this period can the child be self-motivated. He must internalize the stimulus cues (verbal in nature) previously associated with socializing adults and direct his attention to relevant aspects of the stimulus situation. This is reflected in the developmental patterns or curves associated with central versus incidental learning and memory.

Extrinsic motivation, in the form of manipulation of consequent conditions is also a mode of facilitating attention. This differs from the foregoing discussion of external motivation in that it is not antecedent but rather consequences which are changed. Further, such manipulations are derived from learning theory or empirical data on learning and its facilitation. This paradigm usually does not consider what the attender brings to the learning situation in terms of cognitive capabilities. Here, operant conditioning or behavior modification is the focus. The student will gain an orientation into the use of such techniques by reading the articles at the end of this section. These articles present some of the problems inherent in using operant conditioning with a variety of children. They also demonstrate that different reinforcers are more effective with certain types of children. The student should acquire an understanding of the variable influencing attention and performance in different task settings. While selection of articles to be read in this section is somewhat arbitrary (they could equally well be covered in the later section on behavior modification) an acquaintance with different techniques of using external consequences and some of the problems accompanying their use with developing children should be gained.

The student should realize that different techniques of motivating children are available. These include manipulation of the stimuli themselves, related to novelty effects and developmental level of the child; instructional sets, related to both external and internal mediation, and manipulation of consequent event, operant conditioning. Operant techniques can be used much of the time to promote attending behavior. While only in certain situations will it be absolutely necessary for the teacher to establish a special operant conditioning regime for a particular child, the consistent application of behavioral principles will be of great assistance to the teacher. In order to implement properly a behavior modification format,

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however, the teacher must be ready to engage in extensive planning. While a behavior modification program would probably increase the probability of successfully training attending skills, in some instances the only systematic intervention needed are changes in antecedent stimuli themselves and age appropriate-tailoring of instructions. In general, the more severe the deficiency in attention ability the more necessary will it be to apply operant conditioning techniques.

Selected Readings on Motivation and Attention

Hagen, J.W. and West, R.F. The effects of a payoff matrix in selective attention. Human Development, 1970, 13, 43-52.

Haring, N.G Attending and responding. San Rafael, California: Dimensions Publishing Co., 1968, 34-83.

Sprague, R.L. and Toppe, L.K. Relationship between activity level and delay of reinforcement in the retarded. Journal of Experimental Child Psychology, 1966, 3, 390-397.

Witryol, S.W., Lowden, L.M., and Fagan, J.F. Incentive effects upon attention in children's discrimination learning. Journal of Experimental Child Psychology, 1967, 5, 94-108.

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COGNITIVE STYLES AND COGNITIVE CONTROLS

Recently, investigators of cognition and perception have departed from the more traditional aspects of perception and have started to look into the more functional aspects. Along with this departure from an interest in the universal laws of cognition and stimuli giving rise to certain perceptual experiences has come an interest in the individual and the cognitive patterns which set him apart from others. These patterns have been regarded as stable and enduring characteristics which serve one's adjustment to variable environments. They have been labeled cognitive styles and cognitive controls by different researchers.

The major lines of investigation of cognitive styles and controls are three in number. Witkin, Kagan and Klein are responsible for three relatively independent approaches to the area. The concept or construct of cognitive style has been used by both Witkin and Kagan, while the term cognitive control is the product of Klein's work in the area. Unfortunately, the terminology as it refers to the three different systems of cognitive investigation is not always made explicit in many investigations into the cognitve realm. One finds that the terms cognitive control and cognitive style are frequently used interchangeably, and that one must make a differentiation regarding which system has been used by carefully noting references and definitions of constructs.

Both the works of Witkin and Kagan are relatively atheoretical, while that of Klein is in keeping with the psychoanalytic framework. All of the systems have seen recent application in the area of psychopathology (in its broad sense) in recent years. Alined with this has been some attempt to trace the development of deviant cognitive styles and controls and to try to modify them. The interest here will be in the application of research on cognitive styles and controls and their modification with children demonstrating problems of attention behavior. Of particular interest will be the bipolar construct reflectivity-impulsivity, one of the cognitive styles identified by Kagan and his associates. Before giving this construct special attention, the lines of approach to cognitive style and cognitive controls will be outlined for the reader. This should help to differentiate between the concepts as used in the three systems of investigation and serve as a basis for future reading.

While conducting some experiments into the universal laws governing perception of the upright, Witkin became aware of the consistency with which some individuals used perceptual cues while others used kinesthetic cues. These studies used the well-known tilting room laboratory procedure. In accord with these findings, Witkin changed his area of inquiry to that of investigating the individual consistencies which he had found. Subsequent investigation showed that consistent individual differences were found using procedures that did not relate to kinesthetic cues. The particular tasks used were the Rod and Frame Test and the Embedded Figures Test. The results led Witkin and his associates to put forth the bipolar construct "Field Dependence-Independence." The following quotation from Santostefano will make clear what is meant by this constuct.

> Individuals whose cognitive functioning was characterized by the style of Field Dependence tended to submit passively to influences of the prevailing background and had difficulty keeping an item separate

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from its surroundings, while indivduals characterized by the style of field Independence tended to overcome the context in which information was embedded. (1)

With this set of concepts in mind, Witkin and his associates proceeded to investigate behaviors and variables which were related to or determined by Field Dependence-Independence. Many correlates were found in various test situations and in clinical data. As research continued the construct was reformulated. The bipolar construct "global versus articulate" was put forth. Witkin (1967) described this concept as follows:

> At one extreme there is a consistent tendency for an experience to be global and diffuse; the organization of the field as a whole dictates the manner in which its parts are experienced. At the other extreme there is a tendency for experience to be delineated and structured; parts of the field are experienced as discrete and the field as a whole organized. (1)

Global individuals have been rated as emotionally dependent on others, needing others to define their feelings for them, solving W.I.S.C. Block Designs poorly, giving global, poorly organized responses to ink blots, having a diffuse sense of identity, etc.

Kagan's research followed a very similar line. His discoveries were the product of initially unplanned findings, followed by empirical investigations. Beginning with a task which required individuals to group pictures of human figures in any manner they chose, he found some individuals who consistently analyzed the task, dividing it up into components and using labels for these components. Others responded to the whole task in a relatively undifferentiated fashion. The former mode of approach was labeled analytic, whereas the latter became known as nonanalytic. Performance on this task was correlated with a variety of test situations. A certain consistent picture began to emerge. The analytic individuals were less dependent upon their families according to ratings, better able to relate their feelings, striving for social recognition, obtained higher I.Q.'s, showed persistence to task problems, grouped words on serial learning tasks by categories, were resistant to distractors, and produced well differentiated response to Rorshach ink blots. Kagasn's conceptualization of the analytic-nonanalytic cognitive style was identical to the articulate-global style postulated by Witkin. More cognitive styles were differentiated by Kagan, all of which may be looked at as bipolar constructs. These include reflectivity-impulsivity (cognitive tempo), egocentrism-stimulus centration (cognitive-classification), analysis-description (conceptual categores), and influential-relational (conceptual orientation). As previously mentioned, the cognitive tempo dimension will be the primary concern for the purposes of this module. This dimension is seen as a component of the analytic-nonanalytic conceptualization which may serve or interfere with a child's efforts to deal with the requirements of the classroom.

Klein's conception of cognitive controls comes from a different framework of investigation than the two constructs of cognitive style previously discussed. He, too, was impressed by the stable individual differences in cognitive behavior which could not be accounted for by formal aspects of perception. However, Klein entered the field of inquiry iwht psychoanalytic

theory as a foundation. [illegible]

In his formulation of [illegible] relied directly upon the psychoanalytic [illegible] represents a self-regulative, dynamic [illegible] defense which attempt to bring [illegible] limitations and opportunities and which [illegible] individual giving them a unique, consistent [illegible]

Klein used some of the recent theoretical [illegible] to the conflict-free sphere of the ego. [illegible] on a theoretical model, the type of research he did was different from that of either Kagan or Witkin. His research was governed by the following concerns: what purposes do cognitive [illegible] necessary conditions for them to operate, and how many of these "control" mechanisms are there? Four cognitive controls were then identified which have stood the test of time. These are cognitive control principles of focal attention, field articulation, leveling-sharpening, and scanning range. Briefly, focal attention pertains to [illegible] of attention across aspects of a stimulus field. [illegible] to selectivity of attention. Leveling-sharpening refers to how a person perceives and makes adaptive use of gradual [illegible] and equivalence range pertains to how a person [illegible] The Santostefano article (1) will [illegible] constructs, which are all bipolar in nature. [illegible] will become clear that Santostefano favors the cognitive control conceptualization. He is, however, addressing himself to an audience of psychologists and clinicians who work with children. Some of the [illegible] controls identified by Klein in modifying the learning processes of different sorts of children will be of interest to the student.

The Santostefano article (1) which is the major reading from this section of the module has been taken [illegible] the only article the student will be required to read which has cognitive [illegible] tempo as a major interest. It is a good source for [illegible] the current cognitive dimensions in the literature. The student should be aware, however, that these are not the only [illegible] of as cognitive styles. Cognitive style encompasses such things as [illegible] versus convergent thinking, need for approval, [illegible] ment motivation, and neurotic styles of approach to tasks.

Selected Readings on Cognitive Style and [illegible]

Santostefano, S. Cognitive controls versus cognitive styles: An approach to diagnosing and treating cognitive dimensions in children. In A. Chess and A. Thomas (ed.) Annual Progress in Child Psychiatry and Child Development. New York: Brunner/Mazel Publishers.

[illegible]

As has been illustrated, cognitive style is a relatively new [illegible] an individual's manner of approaching tasks. Typically, the teacher looks at whether or not a pupil was correct or incorrect in task performance.

tempo. Child Development, 1971, 42, 1276-1281.

Keogh, B. and Donly, G. Field dependence, impulsivity and learning disability. Journal of Learning Disabilities, 1972, 5, 3310336.

Ridberg, E.H., Parke, R.D., and Hetherington, E.M. Modification of impulsive cognitive styles through observation of film-mediated models. Developmental Psychology, 1971, 5, 364-377.

Yando, R.M. and Kagan, J. The effect of teacher tempo on the child, Child Development, 1968, 39, (1), 27-34.

Zelnicker, T., Jeffery, W.E., Ault, R. and Parson, J. Analysis and modification of search strategies of impulsive and reflective children in the matching familiar figures test. Child Development, 1972, 43, 3210336.

Following the Additional References on Cognitive Style section the reader will be presented with a series of abstracts which should be used as study-guides. These abstracts will include all of the articles listed above and some articles which the student is not required to read.

Additional References on Cognitve Style

Kagan, J. Reflection-impulsivity: the generality and dynamics of conceptual tempo. Journal of Abnormal Psychology, 1966, 71, 17-24.

Kagan, J., et al. Information processing in the child: significance of analystic and relective attitudes. Psychological Monograph, 1964, 78 (1, Whole No. 578).

Santostefano, S. and Slayton, S. Training the preschool retarded child in focusing attention: a program for parents. American Journal of Orthopsychiatry, 1967, 37, 732-743.

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*indicates required reading

Study:	*Adams (1972)
Ss.:	A sample of 50 6-year-old and 52 8-year-old white children used. From these children 20 impulsive and 20 reflective subjects at each age level were chosen. Equal numbers of males and females were used.
Major Purpose:	1) To see whether impulsive and reflective children are differentiated by their strategies at one age level. 2) To see if these differences continue to differentiate Ss. at another age level.
Independent Variables:	1) Cognitive tempo 2) Age
Dependent Variables:	Aspects of strategies used: 1) Perseveration 2) Patterned sequence guessing 3) Win-stay 4) Lose-shift
Results:	1) Impulsive made more correct responses than reflective 2) Younger Ss made more correct responses than older Ss. 3) Young impulsives made more correct responses 4) Older Ss used strategy 2 more at outset 5) Younger Ss used strategy 2 increasingly 6) Young reflectives gave more strategy 2 responses than the others 7) Reflectives used strategy 4 more than impulsives 8) Young reflectives used strategy 4 more than young impulsives 9) Young impulsives gave more win-stay responses (strategy 3).
Study:	Debus (1970)
Ss.:	
Major Purpose:	To investigate the effects of models on impulsive children.
Independent Variables:	4 types of models: 1) Impulsive 2) Reflective 3) Impulsive shifting to reflective 4) Two models—impulsive first and then a reflective. Each gave a verbal description of his response strategy. Reflective models were successful. Impulsive models were unsuccessful. This was indicated by the Experiementer.
Dependent Variables:	1) Response latency 2) Errors
Results:	1) All models except impulsives altered response latency in girls. 2) Only reflective models altered latency in boys. 3) Errors were not reduced under any condition. 4) Most of these effects were transitory. Only girls who had observed the changing model (3) retained greater latencies over 2½ week period.
Evaluation of Design:	Confounding of independent variables

Study:	*Denny (1972)
Ss:	231 2nd grade boys 72 selected on the basis of cognitive style "relational or analytic."
Major Purpose:	To investigate the effects of modeling on cognitive styles and cognitive tempo.
Independent Variables:	4 modeling conditions
Dependent Variables:	1) Latency 2) Errors
Results:	1) Modeling had significant effects on cognitive tempo. 2) Errors were not reduced. 3) Cognitive "style" and "tempo" seem to be functionally independent.
Study:	*Heider (1971)
Ss:	80 7-year-old boys 80 9-year-old girls Half of each group was of low socioeconomic status, while the other half was of middle socio-economic status.
Major Purpose:	To investigate the effects of 3 methods of modifying cognitive tempo on visual and verbal tasks.
Independent Variables:	1) Control 2) Forced delay of response 3) Reward increased motivation 4) Teaching a new task strategy.
Dependent Variables:	1) Number of errors 2) Reaction time
Results:	1) No conditions had a significant effect on middle socioeconomic status subjects 2) A decrease in errors was found for low socioeconomic status subjects. a) for the visual task–independent variable 4 was effective b) for the verbal task–independent variables 2 and 4 were effective 3) An increase in reaction time for low socioeconomic subjects a) visual task–4 and 3 effective b) verbal task–4 was effective.
Evaluation of Design:	No flaws.
Study:	*Keogh and Donlon (1972)
Ss:	27 males with severe learning and behavioral disorders. 25 males with moderate learning problems.
Major Purpose:	To investigate relationships between field dependence and impulsivity and learning disability.
Independent Variables:	Severity of L.D.
Dependent Variables:	1) Field Dependence 2) Impulsivity 3) Pattern Walking
Results:	1) Field dependence was characteristic of both groups 2) Those with severe L.D. had significantly shorter response times and more errors than did the other group.
Evaluation of Design:	1) Merely a correlational study. 2) The rod and frame apparatus was modified. Only face validity with Witkin's original apparatus can be claimed.

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Study:	Meichenbaum and Goodman (1969)
Ss:	30 children (17 females, 13 males). Age range 63–76 months. Mean age 68 months.
Major Purpose:	To examine the relationship between the ability to control motor behavior verbally and reflection-impulsivity.
Independent Variables:	Tapping Task Overt and Covert Conditions 1) Baseline 2) Saying "letter" 3) Saying "faster" 4) Saying "slower" Foot depression task Overt and Covert Conditions 1) Saying "push" 2) Saying "don't push"
Dependent Variables:	1) Total number of taps in 2 second intervals
Results:	1) Impulsive Ss used their self-instructions differently from reflective Ss in tapping task. 2) Degree of verbal control of motor behavior in the foot depression task was related to cognitive tempo especially under covert conditions.

Study:	*Ridberg, Parke & Hetherington (1971)
Ss:	50 impulsive and 50 reflective fourth grade boys
Major Purpose:	To investigate the effects of a film mediated model on cognitive style.
Independent Variables:	1) Scanning clues 2) Verbal clues
Dependent Variables:	1) Response latency 2) Error scores
Results:	1) Latency effects a) Impulsive Ss increased in latency b) Reflectives showed a paradoxical increase in latency (IQ interacted with cue effects) 2) Error effects a) error decreased for impulsives b) error increased for reflection

Study:	Siegelman (1969)
Ss:	100 white males chosen at random from fourth grade classes (median age–9 years, 7 month).
Major Purpose:	To explore the differences between reflective and inpulsive Ss on a variety of categories of pre-response observing behavior.
Independent Variables:	Activity level
Dependent Variables:	Frequency of looking behavior 1) total 2) standard 3) alternatives 4) chosen alternatives Duration of looking behavior 1) total 2) looking behavior 3) standard

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4) alternatives
5) longest observed
6) chosen alternative

Results:
1) All absolute measure of looking behavior favoured reflectives
2) All measures of duration favored reflectives
3) Reflectives spend proportionally less time and looked less frequently at the standard. Most observed alternatives and the chosen alternative most.
4) Impulsives gained 2½ times as many alternative items as reflectives
5) Reflectives took slightly longer per look at alternatives

Study: *Yando & Kagan (1968)

Ss: 160 first graders (80 male and 80 female)

Major Purpose: To investigate the effects of impulsive and reflective models (teachers) on decision times in first graders.

Independent Variables:
1) Teacher tempo
2) Teacher experience

Dependent Variables:
1) child tempo–number of errors, response time.

Results:
1) No significant effects for errors
2) Main simple effect for teacher tempo (increased reaction time)
Large effect for boys with experienced-reflective teachers.

Evaluation of Design: Possible confounding across 1 school year of teacher-pupil interaction.

Study: *Zelnicker, Jeffrey, Ault & Parsons (1972)

Ss: 40 3rd graders, 20 male, 20 female, age range 8-2–9-6 (mean=9-1)

Major Purpose: To investigate problem-solving strategy

Independent Variables:
1) Reflectivity–Impulsivity
2) Exposure to DFF (differentiating Familiar Figures Test)

Dependent Variables:
1) Eye fixation
2) Errors
3) Latency

Results: Exposure to DFF changed the search behavior of impulsives. Latency did not change, however, there were fewer errors.

Evaluation of Design: No flaws.

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TECHNIQUES FOR FACILITATING ATTENTION

The adjustment of teaching materials to the developmental level of the learner should be an area with which the student is already familiar. He has already read several articles upon the development of attention and should be considering changes necessary for both normal and exceptional preschoolers. Although the same materials may be used for both normal and atypical children at the preschool level, it may be necessary to use these materials in different ways with different sorts of children. The Zaporozhets article has emphasized the tactile, kinesthetic, and motor skills of sensory development and training. The student will find that these modes need particular emphasis with atypical children. Thus the Zaporozhets article should provide a guideline for adapting the usual preschool materials to the needs of exceptional children. A chapter by Shif (1969) should help the student to make changes in task materials particularly for mentally retarded children. This article compares the development and associated needs of mentally retarded and normal children. This article is in some ways supplemental to the Zaporozhets article of a previous section. The reader should consider these two articles as exemplar of two types of approaches to adjusting task materials to the developmental level of the learner; i.e., adjustments made according to a particular developmental function and adjustments made ofr a particular population of atypical individuals.

Selected Readings on the Adjustment of Task Materials to the Developmental Level of the Learner

Shif, Z.I. Development of children in schools for the mentally retarded. In M. Cole and I. Maltzman (Ed.) A Handbook of Contemporary Soviet Psychology. New York: Basic Books, Inc., 1969.

Introduction to Selected Readings for Facilitating Attention

For all of the readings following this section of the module the student will have a set of article abstracts which will key him into the most important aspects of the research studies presented. These abstracts will include every article on the required reading list for this section but will not be limited only to them. The abstracts would enable the student to process and integrate the studies efficiently. Topics to be considered are the use of special classroom environments (similar to cubicles), direct teaching of attention behavior (the student should already be aware of many strategies), modeling (abstracts presented along with the Cognitive Styles and Cognitive Controls section), and behavior modification. In these readings the student should consider the population sampled and their similarities to and differences from the student with whom he works. Such considerations include age, sex, mental age, socioeconomic status, and the like. The student should be attuned to key variables in these studies, including manipulations used and performance measures. He should attempt to apply successful manipulations to teaching strategies in line with desired outcomes for the learner (performance measures).

Selected Readings on Techniques for Facilitating Attention

Special classroom environments

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Cruickshank, W.M., Bentzen, F.A., Ratzburg, F.H., Tanhausser, M.T. A teaching method for brain-injured and hyperactive children. Syracuse, N.Y.: Syracuse University Press, 1957.

Gorton, C.E. The effects of various classroom environments in performance of a mental task by mentally retarded and normal children. Education and Training fo the Mentally Retarded, 1972, 7, 32-38.

Direct instruction of attention behavior

Johnson, P.J., Warner, M.S., and Lee, C.R. Effects of enforced attention and stimulus phasing upon rule learning in children. Journal of Experimental Child Psychology, 1970, 9, (3), 388-399.

Modeling

These articles are covered under the section on Cognitive Styles and Cognitive Controls.

Behavior modification

Brinbrauer, J.S., Bijou, S.W., Wolf, M.M and Kidder, J.D. Programmed instruction in the classroom. In L.P. Ullman and L. Krasner (Ed.) Case Studies in Behavior Modification, New York: Holt, Rinehart, and Winston, 1965, 358-363.

Haring, N.G. and Hauck, M.A. Improved learning conditions in the establishment of reading skills with disabled readers. Exceptional Children, 1969, 35, 341-352.

Siegel, A.W. and Van Cara, F. The effects of different types of reinforcement on young children's incidental learning. Child Development, 1971, 42, 1596-1601.

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Abstracts of Readings on Techniques for Facilitating Attention

*Indicates required reading

Study:	*Gorton (1972)
Ss:	42 Ss. 14 mentally retarded (brain damaged) 14 mentally retarded (familial) 14 normal
Major Purpose:	To investigate the effects of different classroom environments on task performance.
Independent Variables:	1) Secluded environment 2) Partially secluded environment (visual) 3) Partially secluded environment (auditory) 4) Non-secluded environment
Dependent Variables:	1) Task performance
Results:	1) Organically and non-organically retarded did not differ in overall performance 2) Cultural-familial M.R.'s did better with visual seclusion 3) Brain-damaged M.R.'s did better in complete seclusion 4) Normals performed best in secluded and secluded visual environments.
Study:	*Johnson, Warner & Dean (1970)
Ss:	40 first graders age range 6-8 years (median age 6-8) Middle class Ss. mean IQ of 106
Major Purpose:	Experiment I 1) To explore the effectiveness of an enforced (E.A.) procedure. 2) To investigate the interaction of E. A. with rule difficulty
Independent Variables:	Attention 1) Enforced attention (pointing response) 2) No enforced attention Rule 1) Biconditional (½ E.A., ½ non E.A.) 2) Disjunctive (½ E.A., ½ non E.A.)
Dependent Variables:	1) Mean number of errors to criterion 2) Proportion of errors to each of the four stimulous classes
Results:	1) EA improved rule learning over standard (control) procedure a) EA facilitated learning of the biconditional rule more than the disjunctive 2) EA had no marked effect upon the distribution of errors across stimulous classes.
Evaluation of Design:	No Flaws
Ss:	Same population samples as above 40 Ss–Age range 6-2–8 years (median age 6-4)

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Major Purpose:	Experiment II 1) To facilitate RL (rule learning) performance by training Ss to adopt a truth-table strategy.
Independent Variables:	Truth Table Strategies 1) True-true–1st condition 2) False-false–1st condition Rule Learning Conditions 1) Standard rule learning instruction ½ T-T first ½ F-F first 2) Enforced attention (E.A.) ½ T-T first ½ F-F first
Dependent Variables:	Mean number of errors
Study:	*Haring & Hauck (1969)
Ss:	4 male Ss who were severely disabled readers and had average or above average IQ. Ss were from grades 3-5 with two at the 4th grade level.
Major Purpose:	To investigate and establish reading skills in 4 boys with severe reading disabilities using systematic instructional procedures.
Independent Variables:	1) Tokens given after S emitted any response designated by the teacher as reading behavior 2) No token given to another group (control group)
Dependent Variables:	Reading achievement
Results:	Significant reading gains
Study:	Heitzman (1970) *International Dissertation Abstracts*
Ss:	94 black and caucasian primary school pupils Token receiving: Ss=55 No token receiving: Ss=39
Major Purpose:	To test the effects of a token system on reading skills learning by migrant primary school pupils.
Independent Variables:	1) Tokens given after S emitted any response designated by the teacher as reading behavior 2) No tokens given to another group (control group)
Dependent Variables:	1) Reading achievement for experimentals vs. controls 2) Reading achievement for blacks vs. whites 3) Reading achivement under high versus low token conditions 4) Black vs. white comparison of high vs. low token receivers.
Results:	1) Tokens were associated with high achievement gains, particularly for black pupils 2) A token system had varying effects on blacks vs. whites 3) No relationship found between number of tokens and reading programs
Evaluation of Research Design:	Non-uniform reinforcement across Ss. Behaviors reinforced were not specified.
Results:	1) EA more effective 2) F-F 1st more effective (only marginal significance) 3) Important interaction effects.

Study:	*Birnbrauer, Bijou, Wolf, & Kidder in Ullman & Krasner (1963)
Ss:	Retarded children, 8 males, EA 9-13, MA 5-5–7-3. Both brain damaged and familial retardates were included.
Major Purpose:	To investigate the use of programmed instruction and token reinforcement in the academic and social achievements of mentally retarded youngsters.
Independent Variables:	1) Programmed instruction 2) Token reinforcement
Dependent Variables:	1) Rate of work 2) Number of errors 3) Rate of disruptive behavior
Results:	1) Rate work increased 2) Number of errors was maintained at a minimal level 3) Disruptive behavior was kept to a minimum
Evaluation of Design:	It is difficult to isolate the actual variables which promoted changes. No reversal or similar control procedure was employed.
Study:	*Hagen & West (1970)
Ss:	40 EMR males of 2 CA levels (20 Ss had a mean CA of 14.7 and 20 Ss had a mean CA of 11)
Major Purpose:	To investigate the effects of differential payoffs on selective attention.
Independent Variables:	1) CA level 2) Differential incentives for primary and secondary stimuli responses 3) Trials
Dependent Variables:	Covert responses to primary and secondary stimuli.
Results:	1) Increasing CA was not significantly associated with high task performance 2) Practice facilitated attention set especially in younger Ss.
Evaluation of Design:	No flaws
Study:	Kortas (1969) *International Dissertation Abstracts*
Ss:	17 Ss, aged 8-10–12-5, IQ range 53-86.
Major Purpose:	1) To test the effects of token reinforcement in a natural class setting 2) To determine the effect of a contingency based on correct reading response on the social behavior of Ss.
Independent	1) Baseline–40 days (B_1) 2) Introduction of tokens (13 days) (T_1) 3) Return to baseline (15 days) (B_2) 4) Reinstatement of tokens (16 days) (T_2)
Dependent Varaibles:	1) Percent of items correct 2) Number of items completed 3) Percent of deviant behavior of four target children 4) Reading achievement levels.

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Results:	1) Percent of items correct increase significantly from B1 to T1. Decrease on B2 conditions. Significant increase at T2. 2) Number of items completed decrease at T1, increased at B2, and decreased at T2. 3) Deviant behavior decreased with introduction of tokens, and continued to decrease at a decelerating rate. Also attention behavior increased with the introduction of tokens and continued to increase at a decelerating rate. 4) The Metropolitan Reading Achievement Test showed a group average gain of 1.0 years in 7½ months of programmed reading.
Evaluation of	Averaging of scores tended to hide the idiosyncratic behavior of Ss.
Study:	*Siegel & Van Cara (1971)
Ss:	108 elementary school children, 36 at each age 5, 7, 9. 13 black and 23 white at age 5. Even split of black and white at ages 7 and 9.
Major Purpose:	To investigate the incidental learning of Ss at increasing ages.
Independent	1) Rb conditions 1 marble for each correct response. 2) Rw condition 1 marble if correct–1 marble if wrong 3) –1 marble if incorrect.
Dependent Variables:	Correct responses
Results:	Condition Wb produced more attentional involvement
Study:	*Sprague & Toppe (1966)
Ss:	30 TMR children (13 male and 17 female)
Major Purpose:	To investigate the relationship between activity level and delay of reinforcement.
Independent Variables:	1) Activity level 2) Number of trials
Dependent Variables:	Number of errors
Results:	1) Low-active group had more correct responses 2) More improvement in performance of low-active group over trials.
Evaluation of Design:	No flaws

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EVALUATION OF INTERVENTION TECHNIQUES

Evaluation of interventions used in the classroom is an important component of any educational program which the teacher might wish to try out. The teacher should have some valuable new techniques to try out at the completion of this module; however, it is important that he note whether these new techniques have the effect desired. Only when this is known can appropriate changes be made which will make the techniques more effective with different age levels and sorts of special children.

Throughout the module the student has been reading studies with dependent variables. It is these variables which form the measures to be evaluated. Just as the studies use research designs and statistics to evaluate the effects of manipulations made, so should the teacher use objective measures as a basis of evaluation.

The cognitive tempo area provides a good example of variables which the teacher can evaluate objectively after she has manipulated the learning and attention environments. The teacher would probably want to give the Matching Familiar Figures Test to his students or a portion of them before and after he has changed something. In his post-test, he would look for fewer errors and longer response latencies in impulsive children.

Behavior modification also provides a good example of a technique which can be evaluated objectively. The teacher would want to target a particular behavior which he expected to see changed by the reinforcement of attention. He would then record the frequencies of the appropriate behavior before and after the intervention.

The teacher will often have to use his ingenuity in evaluating interventions he has used. Research articles will provide some help. It would be a good idea for the teacher to list intervention procedures he might use for different sorts of developmental attention problems and evaluation measures associated with them.

ADDITIONAL READINGS ON ATTENTION

Hallahan, D.P. and Cruicksank, W.M. Psychoeducational foundations of learning disabilities. Englewood Cliffs, New Jersey: Prentice-Hall, 1973.

Much of this book deals with the current research on the hyperactive and distractible child. One entire chapter is devoted exclusively to attention and motor control (chapter 7, pp. 217-238). The book also provides an overview, in historical perspective, on education methods for distractible children.

Haring, N.G. Attending and responding. San Rafael, California: Academic Publishing Co., 1968.

An operant conditioning orientation to attention is presented in this booklet. It discusses parental influences in children's learning, behavior modification principles for the classroom, instructional procedures for improving class performance, and instructional materials. The booklet also provides a fairly extensive bibliography on operant techniques, particularly references on the facilitation of attention and learning. The booklet provides a good, concise review of operant techniques.

Luria, A.R. Speech and the regulation of behavior. New York: Liveright Publishing Corporation, 1961.

A short book containing the text of three lectures given by Luria at University College, London, in 1958. These lectures are devoted to an analysis of the development of the regulatory functions of speech in the developing child. Also considered are pathologies of the regulatory function associated with pathological brain conditions. Complex volitional behavior in humans is considered in the context of the social environment and the physiological nature of the organism. Many laboratory experiments are reported to the reader.

Trabasso, T. and Bower, G.H. Attention in learning: Theory and research. New York: John Wiley and Sons, 1968.

A review of theory and research in attention with a learning theory orientation. The book is concerned with developing hypotheses about the operation of attentional processes in the human organism when he is involved in learning classifications. The book is an exercise in the generation of theoretical constructs representing attentional processes. The book also contains numerous mathematical models for learning and attention.

ATTENTION MODULE SCHEDULE

Class 1. Handout and discuss Class Format for the Attention Module. Discuss Competencies for the Attention Module. Orientation to the Attention Module and its parts. Draw cards and explain the purpose of this. Discuss module requirements.

1. Attention project
   a. Measure attention spans of normal and atypical children on comparable tasks.
   b. Select a child with an attention problem.
   c. Make modifications which will increase the attention of the child selected in an area which is a special problem for him.
   d. Performance based evaluation by supervisors.
   e. Write up project (3 page limit).
      1. Baseline graph (or other measure) of attention.
      2. Discussion of intervention(s) used.
      3. Post-intervention graph (or other measure)of attention.
2. Study-guide outline of articles for which you are particularly responsible. On a separate sheet of paper, please give me a brief evaluation of each of your articles by answering the following questions:
   a. Has this article been useful to you? Please explain.
   b. Do you feel this article is redundant with other articles? If yes, which ones?
   c. Should this article be kept as part of this module? Why or why not?
3. Cognitive exam which covers:
   a. Class lectures.
   b. The Attention Module proper.
   c. Articles which back-up the module.

   Note Everyone is responsible for the content of all articles, but you may not need to read them all if you attend lectures and everyone does his share for the class discussions after Xmas.

Lecture
1. Ontogenies of attention.
2. Developmental attention
3. Gaining and maintaining attention.

Assignment
Read pages 1-18 of the module.

Class 2. Gripe seesion
Lecture
1. Motivation and attention.
2. Cognitive styles and cognitive controls.

Assignment
Read pages 19-38 of the module.

Class 3. Gripe session
Lecture
1. Faciliatating attention

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Assignment
Read pages 39-48 of the module.

Class 4. Group presentations and discussion. Those who have drawn cards with numbers 1-5 will present brief reviews of the corresponding articles.
Assignment
1. All study-guide outlines are due today.
2. Read pages 49-51 of the module.

Class 5. Group presentation and discussion. Those who have drawn cards with numbers 6-10 will present brief reviews of the corresponding articles.
Handout study-guide outlines.

Class 6. Cognitive examination
Module Evaluation-Fill out written form.
Assignment
1. Project write-ups due.
2. Article evaluations due.
3. Make an appointment with Dr. Ball for evaluation of this module.

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ATTENDING COMPETENCIES

Cognitive Competencies. The student will achieve some mastery of developmental aspects of attention, and he will understand two broad theoretical orientations to developmental attention, selective attention and cognitive tempo. His cognitive competencies will include:

a. Knowledge of the developmental sequence of attention behavior. The student is expected to be able to recognize what is normal at given age levels.

b. Characteristics of atypical development. The student is expected to be able to recognize what constitutes a deviation from normal attention behavior. He should integrate this knowledge with what he knows about the development of groups of exceptional children.

c. Awareness of the broad range of attention problems which are characteristic of exceptional children. Accompanying this awareness should be a knowledge of intervention procedures which can faciliatate attention in different types of exceptional children (as defined by their behaviors.) Such intervention procedures include:

(1) Adjusting task materials to the developmental level of the

(2) Changing the Physical setting in which instruction takes place.

(3) Active intervention strategies including:
(a) Direct teaching of attention behavior.

(b) Modeling

(c) Behavior modification.

Skill Competencies. The student will develop the ability to use various strategies to promote attention in both normal and atypical children. These performance competencies are as follows:

a. Measurement of attention spans. The student will be able to measure attention to various educational tasks, judge its adequacy, and select an appropriate intervention technique if necessary.

b. Adjustment of task materials to the developmental level of the learner. The student will be able to adjust educational materials which are available in the classroom environment to the developmental level of both normal and atypical children.

c. Changing the physical setting in which instruction takes place. The student will be able to make whatever modifications are necessary in the physical set up of his classroom to accommodate both normal and atypical learners.

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d. Using active intervention strategies. The student will be able to use one or more of the following active intervention strategies to promote attention.

(1) Direct teaching of attention behavior.

(2) Modeling attention behavior.

(3) External mediation of attention behavior.

(4) Behavior modification to increase attending behavior.

... The student will be able to evaluate the effectiveness of his strategies in promoting attention. These cognitive and performance competencies include:

a. The utilization of the general experimental model for intervention planning and evaluation. The student will recognize that the general experimental model (manipulation of the independent variables and measuring the dependent variables) is one which should be followed in classroom interventions.

b. The utilization of pre-tests and post-tests in evaluation. The student will recognize the need to use before and after measures in order to judge the effectiveness of his interventions. Such before and after measures might include:

(1) Kagan's Matching Familiar Figures Test in modifying cognitive tempo.

(2) Behavioral baseline and post-intervention measures, derived from the methodology of behavior modification, which could be useful for almost any intervention strategy.

c. The utilization of evaluation techniques for teacher feedback. The student will recognize the need to use evaluative techniques in order to modify his intervention strategies.

d. Recognition of the need for creativity in evaluation. The student will recognize that he needs to be creative in his attempts to evaluate intervention techniques which he is trying out in the learning situation.

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